

CLAIMS

What is claimed is:

1. An externally non-addressable memory for outputting an executable code sequence comprising:

5 a plurality of data storage locations;

a plurality data lines adapted for outputting data stored in the plurality of data storage locations;

an internal address register adapted for storing address information associated with a memory location associated with an instruction to be output on the data lines;

10 means for loading a preselected address into the internal address register upon receipt of run signal representative of a commencement of a preselected code sequence comprised of a plurality of executable instructions stored in the plurality of data storage locations signal; and

counter means for sequentially incrementing the internal address register so that
15 instructions of the code sequence sequentially appear on the data lines until completion thereof.

2. The memory of claim 1 further comprising means for receiving an externally generated clock signal, wherein the counter means is incremented in accordance with the externally
20 generated clock signal.

3. The memory of claim 2 further comprising means adapted for receiving the run signal from an associated data device.

25 4. The memory of claim 2 further comprising means for generating the run signal in accordance with a power on state of an data processing device into which the memory is incorporated.

5. The memory of claim 1 further comprising means for generating a wait signal
30 corresponding to a duration in which no valid data is available on the data lines.

6. The memory of claim 1 further comprising an associated, addressable, random access memory into which the code sequence is copied.

5 7. The memory of claim 2 further comprising an associated processor device, which processor device is synchronized so as to operate on instructions the code sequence as it is output onto the data lines.

8. A bootable NAND flash memory comprising:

10 a plurality of instruction storage locations;
a plurality data lines adapted for outputting instructions stored in the plurality of data storage locations;
an internal address register adapted for storing address information associated with a memory location in which is stored one of a plurality instructions associated with a boot sequence is to be output on the data lines;

15 means for loading a preselected address into the internal address register in accordance with a boot signal representative of a commencement of a boot code sequence; and

20 counter means for sequentially incrementing the internal address register so that instructions of the boot sequence sequentially appear on the data lines until completion thereof.

9. The bootable NAND flash memory of claim 8 further comprising a boot signal generator for generating the boot signal upon power up of a data processing device.

25 10. The bootable NAND flash memory of claim 9 further comprising an addressable, random access memory in data communication with the data lines into which the boot sequence is copied.

30 11. The bootable NAND flash memory of claim 10 wherein the boot signal generator is comprised of a central processor unit.

12. The bootable NAND flash memory of claim 11 further comprising a means for generating a busy signal representative of a duration in which valid boot data is not available on the data lines.

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13. A data processor comprising:

- a central processor unit having CPU address lines and CPU data lines;
- a NAND flash memory having NAND data lines in data communication with the CPU data lines, data associated with such data lines being addressable solely from an address register internal thereto;
- an externally addressable random access memory having RAM address lines in data communication with the CPU address lines and RAM data lines in data communication with the CPU data lines and with the NAND data lines;
- a boot code sequence disposed in a series of memory locations of the NAND flash memory;
- means adapted to generate a boot commencement signal so as to preload the address register with a preselected address associated with the boot code;
- means for sequentially outputting instructions of the boot code disposed in the NAND flash memory to the NAND data lines from which the boot code is copied via the RAM data lines into memory locations of the random access memory; and
- means for commencing operation of the central processor unit from boot code disposed in the random access memory after transfer thereof from the NAND memory.

14. The data processor of claim 13 further comprising means for generating the boot commencement signal in accordance with at least one of a power up or reset of the data processor.

15. The data processor of claim 14 further comprising means for generating a busy signal to suspend operation of the central processor unit until such time as boot code has been stored into the random access memory from the NAND memory.

16. A system for running programs disposed in a non-externally addressable memory comprising the steps of:

receiving a run signal representative of a commencement of a preselected code

5 sequence disposed in the non-externally addressable memory;

upon receipt of the run signal, preloading an internal address register with a preselected address corresponding with a first instruction of the code sequence;

outputting an instruction associated with the address of the internal address register;

incrementing the internal address register so as to output each instruction forming the

10 preselected code sequence.

17. The method of claim 16 further comprising the step of synchronizing the incrementing of the internal address register to correspond with instructions receivable into an associated, central processor unit.

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18. The method of claim 16 further comprising the step of copying the preselected code sequence into an associated, addressable random access memory.

19. The method of claim 18 further comprising the step of generating the run signal in

20 accordance with at least one of power up and a reset of a data processing device.

20. The method of claim 19 further comprising the step of transferring instructions from a secondary memory device upon completion of the code sequence.

25 21. An externally non-addressable memory for outputting an executable code sequence comprising:

a plurality of data storage locations;

a plurality data lines adapted for outputting data stored in the plurality of data storage locations;

30 an internal address register storing address information associated with a memory

location associated with an instruction to be output on the data lines, the internal address register receiving a preselected address upon receipt of a run signal representative of a commencement of a preselected code sequence comprised of a plurality of executable instructions stored in the plurality of data storage locations signal; and

5 a counter to sequentially increment a content of the internal address register in response to a clock signal so that instructions of the code sequence sequentially appear on the data lines.

22. The memory of claim 21 wherein the plurality of data storage locations include

10 nonvolatile memory cells.

23. The memory of claim 22 wherein the run signal is generated in response to a power on state of an data processing device into which the memory is incorporated.

15 24. The memory of claim 21 wherein the memory receives a wait signal representing a duration in which no valid data is available on the data lines.

25. A data processor comprising:

 a central processor unit having CPU address lines and CPU data lines;

20 a NAND flash memory having NAND data lines in data communication with the CPU data lines, the NAND flash memory having an address register data associated with such data lines being addressable solely from an address register internal thereto; and

25 an externally addressable random access memory having RAM address lines in data communication with the CPU address lines and RAM data lines in data communication with the CPU data lines and with the NAND data lines wherein,

 a boot code sequence is disposed in a series of memory locations of the NAND flash memory, the address register preloads a preselected address associated with boot code in response to a boot commencement signal and a sequential instruction output of the boot code is copied, via the NAND data lines and the RAM data lines, into memory locations of the random access memory.